

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**  
**BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES**

|   |   |                   |             |
|---|---|-------------------|-------------|
| In re Application of: John W. Evans                     | ) | Examiner:         | N. OGDEN    |
|   | ) |                   |             |
| Serial No.: 10/629,642                                  | ) | Confirmation No.: | 6851        |
|   | ) |                   |             |
| Filing Date: 07/29/2003                                 | ) | Group Art Unit:   | 1751        |
|   | ) |                   |             |
| For: Non-Aqueous Heat Transfer Fluid and Use<br>Thereof | ) | Docket No.:       | 97541.00022 |

Dated at Hartford, Connecticut, this 3rd day of February, 2009

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**APPELLANT'S REPLY BRIEF**

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In response to the Examiner's Answer and the subsequent Office Communication mailed on December 3, 2008, Appellant provides this Reply Brief to the Examiner's Answer.

**I. STATUS OF THE CLAIMS**

Claims 1-16, 18-42 and 45-48 are pending in the application.

Claims 17, 43 and 44 were cancelled during prosecution.

Claims 18-25 and 33-42 were withdrawn from consideration in response to a restriction requirement.

Claims 1-16, 26-32 and 45-48 stand rejected and are on appeal.

**II. GROUND OF REJECTION TO BE REVIEWED ON APPEAL**

Claims 7, 16 and 32 stand rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement. Claims 1-5, 8-12, 14, 26, 28-30, 45-46 and 48 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Reny, WO89/09806. Claims 1-5, 8-11, 13-14, 26-27, 29-32, 45 and 47-48 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Wood, U.S. Patent No. 4,455,248. For the reasons set forth below, the rejections are improper and should be reversed.

Applicant notes that at page 4 of the Examiner's Answer, the examiner states that the previous rejection of claims 1-16, 26-32 and 45-48 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Coughenour, Chemical Abstracts 120:195478 or Dingley, Chemicals Abstracts 116:86516 or Evans, U.S. Patent No. 5,031,579 each in view of Mascioli, U.S. Patent No. 5,240,631, or Greaney, U.S. Patent No. 5,422,026 is withdrawn in view of Appellant's arguments. Because the Examiner nevertheless discusses the references in the answer, Appellant will address the points raised by the Examiner in this Reply Brief.

### III. ARGUMENT

As described in the specification and recited in the claims on appeal, the present invention is directed to a non-aqueous, propylene glycol based heat transfer fluid. The heat transfer fluid contains only additives that are soluble in propylene glycol and ethylene glycol. The non-aqueous heat transfer fluid does not contain any additives, such as silicates or buffers, that require the addition of water to the non-aqueous heat transfer fluid to dissolve the additive or to permit the additive to function in the fluid (e.g. such as by dissociation). The term “non-aqueous” as used in the claims on appeal is defined in paragraph 0056 of the specification as meaning that “water is present as an impurity in the coolant formulation in no greater than a concentration of about 0.5% by weight.” The non-aqueous heat transfer fluid contains no added water. As recited in claim 45, and described in the specification at paragraph 0047, the non-aqueous heat transfer fluid may contain a mixture of propylene glycol and ethylene glycol that is up to 60% by weight ethylene glycol. Among the advantages of the non-aqueous heat transfer fluid of the present invention is that a single formulation can be used in many different environments. The non-aqueous heat transfer fluid is a stable solution with its inhibitors and there is no drop-out or gelling of additives, regardless of use or storage.

As further set forth in the Declarations of John Evans dated April 15, 2005 (Evidence Appendix Ex. 1) and March 5, 2007 (Evidence Appendix Ex. 2), the non-aqueous heat transfer fluids recited in the claims are fundamentally different from prior art aqueous heat transfer fluids. The primary heat transfer medium of an aqueous heat transfer fluid is water. The freezing point depressant for a glycol-based aqueous heat transfer fluid is a glycol, typically ethylene glycol. The glycol and water combination has a boiling point that is dominated by the water; e.g. the boiling point of an unpressurized heat transfer fluid that is 50% water and 50%

ethylene glycol is raised just 13° F (7° C) from that of water alone. Water is corrosive toward many cooling system metals and corrosion inhibitors that can dissolve in water are required in order to protect against corrosion.

Essential inhibitors for protection against corrosion by an aqueous glycol-based heat transfer fluid require that water be present in order to keep the inhibitors in solution. The literature is replete with warnings against using a heat transfer fluid that is too concentrated (i.e., with insufficient water) because of the problem of additive drop-out, such as the drop-out of silicates or phosphates. Water is also required in *concentrates* for making aqueous heat transfer fluids. An antifreeze concentrate must contain enough water to keep its additives dissolved during storage prior to the adding of water to make the actual heat transfer fluid.

Use of an antifreeze concentrate that is intended for making an aqueous glycol-based heat transfer fluid as a heat transfer fluid itself (without the additional water) will not work because the inhibitors that require water for solubility will not remain in solution. In an automobile cooling system, for example, the products of additive drop-out are in the form of a gel that will plug heat exchanger passageways and cause the cooling system to malfunction. See Penray Company information sheet (Appeal Brief, Evidence Appendix Ex. 5).

The non-aqueous heat transfer fluid of the present invention operates in a fundamentally different way than prior art aqueous heat transfer fluids. As recited in claims 1-16 and 26-32, in one embodiment of the invention, the heat transfer medium of the non-aqueous heat transfer fluid of the present invention is propylene glycol. As recited in claims 45-48, in another embodiment of the invention, the heat transfer medium comprises propylene glycol and ethylene glycol (with propylene glycol comprising at least 40% of the glycol component even in embodiments of the invention in which a mixture of ethylene glycol and propylene glycol is

used). The parameters regarding the heat transfer depend upon the characteristics of the propylene glycol (or the mixture of glycols if there is more than one). The freezing point of the non-aqueous heat transfer fluid is determined by the freezing point of propylene glycol (or by the freezing point of the mixture of glycols if there is more than one). The boiling point of the non-aqueous heat transfer fluid is determined by the boiling point of propylene glycol (or by the boiling point of the mixture of glycols if there is more than one).

Water is not added to the non-aqueous heat transfer fluid of the claims on appeal. The best performance is achieved when the water content is zero. If there is any water present in the heat transfer fluid, it is present only in a small amount as an impurity, not as a heat transfer component, and in any event it is removed from the heat transfer fluid in use. Cooling systems that use a non-aqueous heat transfer fluid of the type described in the claims on appeal benefit from the high boiling points of propylene glycol (369° F, 187° C) and ethylene glycol (387° F, 197° C). These cooling systems can operate without failure at higher temperatures than aqueous systems. The cooling systems do not require pressurization nor do they have any other operating limitations that are based upon the boiling point of water. Any small amount of water vapor that may be present due to water that is present as an impurity is allowed to vent from the system because water is not the coolant. Water-based cooling systems, on the other hand, require pressurization to retain the water within the cooling system because water *is* the coolant. Furthermore, water-based cooling systems fail catastrophically when the coolant exceeds the boiling point of water for the pressure of the system.

Prior to the present invention, the predominant heat transfer fluids were water-based and the prior art was centered on the problems of water-based heat transfer fluids. In the few prior art descriptions of glycol-based, non-aqueous heat transfer fluids, there was either no discussion

of the additives required for use or additives were proposed that included additives required for the control of pH. These views resulted in various approaches to the use of glycol-based, non-aqueous heat transfer fluids prior to the disclosure of the present invention that resulted in either the omission of important additive ingredients or the inclusion of inappropriate additive ingredients that require water to be present in the heat transfer fluids. For example, as discussed in more detail below, some tests of propylene glycol based heat transfer fluids were performed without any corrosion additives present in the fluid, such as those described in Coughenour and Dingley. In other cases, as described for example in Reny, concern about pH caused the inclusion of pH control additives, such as phosphoric acid buffers. In still other cases, as described for example in Mascioli, Greaney and Wood (in antifreeze concentrates that have been incorrectly treated by the Examiner as non-aqueous heat transfer fluids), the heat transfer fluids include water soluble (but non-glycol soluble) additives, such as silicates, that require the presence of added water to dissolve the additives so as to enable them to perform their function. In contrast, the applicant recognized that when the water content is very low, the pH of the fluid is immaterial, and that the heat transfer fluid must avoid all additives that cannot function without water.

**Rejection Under 35 U.S.C. § 112, First Paragraph**

Claims 7, 16 and 32 stand rejected under 35 U.S.C. § 112, first paragraph as failing to comply with the written description requirement. The Examiner states that there is not support in the specification for a propylene glycol amount in the fluid of greater than about 98.5% by weight, although the Examiner states that there is support for greater than about 99.0% by weight. The Examiner cites Purdue Pharma L.P. v. Faulding Inc., 230 F.3d 1320, 1328 (Fed.

Cir. 2000) to support a rejection because “the specification does not disclose to the skilled artisan that applicant considered this specific data point as part of the invention.”

The Examiner is incorrect. In the application as filed, claim 6 recited “wherein said propylene glycol is present in a concentration of about 94.5% to 99.85% by weight...” The limitations for propylene glycol in claims 7, 16 and 32 are plainly within this range. In Vas-Cath Inc. v. Mahurkhar, 935 F.2d 1555, 1563-64 (Fed. Cir. 1991), the Court stated that “ranges found in applicant’s claim need not correspond exactly to those disclosed in [the specification]; the issue is whether one skilled in the art could derive the claimed ranges from the disclosure.” In this case, the recited limitations are *within ranges actually disclosed in the specification and claimed in the application as filed.*

As set forth previously in Appellant’s Brief, the ranges for the components are clearly described in the specification. The specification at paragraphs 0050-0051 states that the heat transfer fluid preferably contains propylene glycol and the additives sodium nitrate, tolyltriazole and sodium molybdate, and that “[t]he additives can be present in a range of about 0.05% by weight to about 5.0% by weight, and more preferably not above about 3.0% by weight.”

The Examiner’s requirement that the specification exactly and literally describe a particular point within the range in order to claim that embodiment is contrary to the law. The written description requirement of 35 U.S.C. § 112, first paragraph “ensures that, as of the filing date, the inventor conveyed with reasonable clarity to those of skill in the art that he was in possession of the subject matter of the claims.” Union Oil of California v. Atlantic Richfield Co., 208 F.3d 989, 997 (Fed. Cir. 2000). “In order to satisfy the written description requirement, the disclosure originally filed does not have to provide in haec verba support for the claimed subject matter at issue.” Crown Operations Intern., Ltd. v. Solutia Inc., 289 F.3d 1367, 1376



(Fed. Cir. 2002). See also In re Hayes Microcomputer Prods., Inc., 982 F.2d 1527, 1533 (“[The applicant] does not have to describe exactly the subject matter claimed.”).

Accordingly, for at least this reason and the reasons set forth in Appellant’s Appeal Brief, the rejection of claims 7, 16 and 32 under 35 U.S.C. § 112, first paragraph is improper and should be reversed.

**Rejection Under 35 U.S.C. §102(b) Based Upon Reny**

Claims 1-5, 8-12, 14, 26, 28-30, 45-46 and 48 stand rejected under 35 U.S.C. §102(b) as anticipated by Reny, WO89/09806. To anticipate a claim under Section 102(b), a single prior art reference must disclose each and every element set forth in the claim. Apple Computer, Inc. v. Articulate Systems, Inc., 234 F.3d 14 (Fed. Cir. 2000); Verdegaal Bros. v. Union Oil Co. of California, 814 F.2d 628, 631 (Fed. Cir. 1987); MPEP § 2131. As described in the Declaration of Evans dated April 15, 2005 at ¶¶ 10-12 (Appellant’s Brief, Evidence Appendix, Ex. 1) and discussed in detail in Appellant’s Brief, Reny does not describe any composition that meets all of the limitations of the claims on appeal.

In its Appeal Brief, Appellant discussed the deficiencies of Reny in detail. The Examiner has not rebutted the deficiencies in Reny discussed in Appellant’s Brief. Instead, beginning on page 9 of the Examiner’s Answer, the Examiner reiterates the general statements in Reny that some undisclosed alkylene glycols or combinations of alkylene glycols may be formulated without water. These general statements in Reny do not overcome the specific teachings of Reny regarding combinations of propylene glycol and ethylene glycol. Specifically, Reny does not teach or describe a non-aqueous heat transfer fluid comprising neat propylene glycol, or combinations of propylene glycol and up to 60% by weight ethylene glycol, that contains less than 0.5% by weight water, and that contains no additives requiring the presence of water to

dissolve the additive or to enable the additive to perform its intended function. To the contrary, all of the heat transfer fluids described by Reny that contain propylene glycol and additives contain phosphoric acid and at least 1% by weight water.

At page 11 of the Examiner's Answer, states that "the examples in Reny are not required to anticipate the claimed invention." However, the examples in Reny are the only formulations that specifically describe the use of propylene glycol and ethylene glycol, and these examples teach that water is required for the fluids to function. The Examiner dismisses these specific examples and teachings in favor of broad and general statements regarding "alkylene glycols." Even these broad statements include the caveat that in some cases, phosphoric acid is required to maintain pH control.

While Reny states in a general way that undisclosed alkylene glycol combinations may contain no water, in all of the heat transfer fluids comprising propylene glycol, or combinations of ethylene glycol and propylene glycol, described by Reny, phosphoric acid and water are included to form a pH buffer. For phosphoric acid to function in a manner as to affect pH, water must be included in order for the phosphoric acid to ionize. Reny states at page 5, lines 21-23, that phosphoric acid is employed "only if necessary" to maintain pH limits. Reny's examples therefore teach that when the alkylene glycol is either propylene glycol or a mixture of propylene glycol and ethylene glycol, *phosphoric acid and added water are required*.

Accordingly, Reny does not teach, describe or otherwise suggest a non-aqueous heat transfer fluid as defined in the specification and recited in the claims on appeal comprising propylene glycol with less than 0.5% by weight water and that does not contain any additives that require water to dissolve the additives in the fluid or to enable the additives to function in the fluid. For at least these reasons and the reasons set forth in Appellant's Appeal Brief, claims 1-5,

8-12, 14, 26, 28-30, 45-46 and 48 are not anticipated by Reny, nor are the fluids recited by these claims obvious in view of Reny.

**Rejection Under 35 U.S.C. §103(a) Based Upon Coughenour, Dingley or Evans**

In the Examiner's Answer at page 4, the Examiner indicates that the rejection of claims 1-16, 26-32 and 45-48 under 35 U.S.C. § 103 based upon Coughenour, Dingley or Evans in view of each of Mascioli and Greaney is withdrawn in view of appellant's arguments. Nevertheless, the Examiner goes on to reargue the points previously made in the final office action, which were rebutted in Appellant's Appeal Brief. While the Examiner's Answer indicates the rejection is withdrawn, Appellant will address certain points regarding these references made in the Examiner's Answer.

The Examiner does not dispute that Coughenour, Dingley and Evans do not describe, teach or suggest the use of a non-aqueous propylene glycol based heat transfer fluid having corrosion inhibitors which are soluble in propylene glycol and which contain no additives that require water in the heat transfer fluid to dissolve the additive or enable the additive to function as recited in the claims on appeal. The Examiner attempts to address the deficiencies in the references by relying on the composition described in Mascioli, and in particular in Table 1. In the discussion of Mascioli on page 12 of the Examiner's Answer, the Examiner ignores the fact that Table 1 of Mascioli also lists phosphorous acid and silicates as ingredients, both of which require water to dissolve the additive or enable the additive to function. The Examiner does not explain why one skilled in the art would selectively choose certain additives described in reference 1 of Mascioli and omit others. See KSR International Co. v. Teleflex, Inc., 550 U.S. \_\_\_, 82 USPQ2d 1385, 1396 (2007)("[R]ejections on obviousness cannot be sustained by mere

conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.”).

A rejection under Section 103 cannot be based on selecting only portions of a reference to support the rejection, to the exclusion of other parts of the reference necessary to understanding what the reference fairly suggests to one skilled in the art. In re Wesslau, 353 F.2d 238, 241 (CCPA 1965). When Mascioli is considered as a whole, as is required under section 103, Mascioli includes additives requiring water to remain in solution, as well as 1% to 5% added water.

Greaney describes a heat transfer concentrate similar to that described in Mascioli, except that the fluid of Greaney does not contain phosphates. Col. 2, lines 30-32. As with Mascioli, the heat transfer fluid contains silicates, an alkali metal hydroxide for pH control, and 1% to 5% by weight added water. Col. 2, lines 37-52 and Table 1. Therefore, when read as a whole, Greaney teaches a heat transfer concentrate that necessarily includes additives requiring water to remain in solution or to perform their function, and between 1% and 5% added water. Accordingly, the combination of any one of Coughenour, Dingley or Evans with either Mascioli or Greaney results in a heat transfer fluid that does not meet all of the limitations of the claims on appeal.

It is only by ignoring these teachings in Mascioli and Greaney that the Examiner is able to construct a composition meeting all of the limitations of the claims on appeal. “Determination of obviousness cannot be based on the hindsight combination of components selectively culled from the prior art to fit the parameters of the patented invention.” ATD Corp. v. Lydall, Inc., 159 F.3d 534, 546 (Fed. Cir. 1998). Accordingly, if the rejection of claims 1-16, 26-32 and 45-48 under 35 U.S.C. § 103 based upon Coughenour, Dingley or Evans in view of each of Mascioli

and Greaney was not withdrawn as stated in the Examiner's Answer, it should be reversed for the reasons set forth above and in Appellant's Appeal Brief.

**Rejection Under 35 U.S.C. §103(a) Based Upon Wood**

Claims 1-16, 26-32 and 45-48 stand rejected under 35 U.S.C. § 103(a) based upon Wood. As set forth in Appellant's Appeal Brief, the formulations described by Wood contain added water. The composition described by Wood "necessarily" contains sodium metasilicate. Col. 3, lines 27-55. The requirement that the fluid described by Wood contain sodium metasilicate necessitates the addition of sufficient water for the sodium metasilicate to dissolve and remain in solution, i.e. in order for the sodium metasilicate to function. As set forth in the information sheet from the Occupational Safety & Health Administration (OSHA), ([http://www.osha.gov/dts/chemicalsampling/data/CH\\_267715.html](http://www.osha.gov/dts/chemicalsampling/data/CH_267715.html)) (Appeal Brief, Evidence Appendix, Ex. 3) sodium metasilicate is not soluble in alcohols such as glycols, but is readily soluble in water. Accordingly, for at least this reason, Wood does not teach or suggest a heat transfer fluid composition as recited in the claims, which recite that the heat transfer fluids of the present invention contain no additive requiring the presence of water in the fluid to dissolve the additive or to enable the additive to function.

Despite this evidence presented by the Appellant, the Examiner states at page 9 of the Answer that "Wood teaches that sodium metasilicate can function in the composition without the presence of water (i.e. non-aqueous) as recited by the instant claims." If Wood teaches that, Wood is wrong. As explained in Appellant's Appeal Brief and demonstrated by the evidence submitted by Appellant, the presence of sodium metasilicate in the formulation of Wood *requires* that water be present in the composition, even in the concentrate. The Examiner has not addressed the overwhelming evidence submitted by the Applicant, and has only reiterated his

own reading of Wood. The Examiner must address the evidence submitted by Applicant in maintaining the rejection. In re Sullivan, 498 F.3d 1345, 1353 (Fed. Cir. 2007) (“[W]hen an applicant puts forth relevant rebuttal evidence . . . the Board must consider such evidence. The claimed composition cannot be held to have been obvious if competent evidence rebuts the prima facie case of obviousness.”)

The avoidance of additives that require water for dissolution in the Applicant’s heat transfer fluid make the Applicant’s fluid fundamentally different from that of Wood. As explained in detail in Appellant’s Brief, additive drop-out would be a very serious problem if Wood’s formulation were actually non-aqueous, a problem that is absent in Appellant’s fluid. If the inclusion of additives that require water for dissolution did not matter, one could avoid the claims on appeal by simply including such an additive.

Accordingly, for at least these reasons, the rejection of claims 1-16, 26-32 and 45-48 stand rejected under 35 U.S.C. § 103(a) based upon Wood should be reversed.

#### **IV. CONCLUSION**


For the foregoing reasons, it is respectfully submitted that reversal of the final rejection of claims 1-16, 26-32 and 45-48 is warranted and such action is earnestly solicited.

The Examiner’s Answer was first mailed on October 17, 2008, and a supplemental paper amending the Examiner’s Answer was filed on December 3, 2008. Accordingly, this paper is timely filed on February 3, 2009. No fee is believed to be required. However, if any additional fee is required, or otherwise if necessary to cover any deficiency in fees already paid, authorization is hereby given to charge any required fees to deposit account no. 50-3569; further,

if any extension of time is required, please consider this a petition therefor, and authorization is hereby given to charge the associated extension fee to deposit account no. 50-3569.

Respectfully submitted,

Date: February 3, 2009

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